

April 29, 2013

MEMORANDUM TO: Anna H. Bradford, Branch Chief
Small Modular Reactor Licensing Branch 2
Division of Advanced Reactors and Rulemaking
Office of New Reactors

FROM: Wesley W. Held, Project Manager /RA/
Small Modular Reactor Licensing Branch 2
Division of Advanced Reactors and Rulemaking
Office of New Reactors

SUBJECT: SUMMARY OF APRIL 17, 2013, PUBLIC MEETING TO
DISCUSS INDUSTRY POSITION PAPER ON SMALL MODULAR
REACTOR SOURCE TERMS

On April 17, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff held a public meeting with the Nuclear Energy Institute (NEI) to discuss their December 27, 2012, submittal of a position paper on small modular reactor (SMR) source terms (Agencywide Documents Access Management System (ADAMS) ML13004A390). The purpose of the meeting was to facilitate discussion between the NRC and NEI regarding the content of the paper.

Summary

Mr. Wesley Held, Small Modular Reactor Licensing Branch 2 (SMRLB2), Division of Advanced Reactors and Rulemaking (DARR), Office of New Reactors (NRO), opened the meeting. Mr. Held provided some background information regarding recent NRC staff and NEI interactions on the paper and its development. Mr. Held then turned the meeting over to Mr. TJ Kim, NEI, for his opening remarks. Mr. Kim thanked the staff for hosting the meeting and introduced the contributors to the paper, Mr. Steven Mirsky, Mr. Edward Burns, and Mr. Steve Kline.

CONTACT: Wesley W. Held, NRO/DARR
301-415-1583

Following Mr. Kim's remarks, industry representatives and NEI presented their SMR source term concepts under two main categories: 1) accident analysis using current source term methodology as outlined in NRC Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents"; and 2) accident analysis using source terms specific to SMR design characteristics. Under category 2 there were three options presented by industry and NEI. These include:

- Use of the category 1 RG 1.183 methodology, taking additional credit for longer release times or other release pathway credits for deposition and holdup, including the non-safety related reactor building.
- Use of a mechanistic source term (MST), a design-specific best estimate consequence analysis.
- A hybrid MST approach that would use the core melt source term from RG-1.183, but could combine a slower melting action with slower release pathway, taking credit for physical properties of the containment and reactor building hold-up and decay.

It was noted by industry representatives and NEI that the reason for considering an alternate methodology to RG 1.183 for integral pressurized water reactors (iPWRs) is that the iPWR designs have eliminated large primary coolant piping and therefore a large break loss of coolant accident does not appear to be possible. In addition, iPWRs have a small core thermal power and a greater reliance on passive safety systems.

The industry representatives and NEI also indicated their plans for potential future source term study, including:

- Small containment aerosol deposition
- Small piping fission product deposition
- Small containment penetration leak rate testing
- Reactor building fission product dilution and deposition
- Submerged containment leakage aerosol removal

The NRC staff agreed that the position paper provided a good general overview of options for the iPWR-specific source term, but noted that the paper or subsequent papers or topical reports should provide details or research plans that would validate credit for non-safety related reactor building deposition. In addition, the NRC staff stated that additional information would be necessary on how the iPWRs would fit into the current licensing framework, including accident event categorization, use of probabilistic risk assessment, applicability of calculation models, treatment of uncertainty for the MST, and selection of safety related structures systems and components.

The NRC staff emphasized that the overall approach of using a MST has previously been addressed by the agency, as described in a July 1993 Staff Requirements Memorandum that allowed the use of the process, but the application of a MST for specific licensing purposes such as a scaled emergency planning zone may require Commission consideration or an exemption from the regulations for iPWRs. The NRC staff also stated that use of a risk-informed MST for plant siting may require a review of the applicant's detailed probabilistic risk assessment (PRA). Validation of the PRA and MST modeling may be resource intensive for a first-of-a-kind design.

A. Bradford

-3-

The meeting concluded with comments and questions from public stakeholders.

The slides from the NEI presentations are available through the Agencywide Documents Access and Management System (ADAMS) under ML13107A193. ADAMS is the system that provides text and image files of NRC's public documents. Documents are available electronically at the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. If you do not have access to ADAMS or have problems accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) staff at 1-800-397-4209, 301-415-4737, or pdrr@nrc.gov.

A participant list is included in the Enclosure.

Enclosure:
Participant List

cc w/encl: NEI New Reactors Mailing List

A. Bradford

-3-

The meeting concluded with comments and questions from public stakeholders.

The slides from the NEI presentations are available through the Agency wide Documents Access and Management System (ADAMS) under ML13107A193. ADAMS is the system that provides text and image files of NRC's public documents. Documents are available electronically at the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. If you do not have access to ADAMS or have problems accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) staff at 1-800-397-4209, 301-415-4737, or pdr@nrc.gov.

A participant list is included in the Enclosure.

Enclosure:

Participant List

cc w/encl: NEI New Reactors Mailing List

DISTRIBUTION:

PUBLIC

RidsOpaMailCenter Resource

RidsOgcMailCenter Resource

ADAMS Accession Number: ML13115A038

NRC-001

OFFICE	PM:NRO/DARR/SMRLB2	BC:NRO/DARR/SMRLB2
NAME	WHeld	ABradford
DATE	4/25/2013	4/29/2013

OFFICIAL RECORD COPY

Participant List

Public Meeting to Discuss Industry Position Paper on Small Modular Reactor Source Terms

Wednesday, April 17, 2013

<u>Name</u>	<u>Affiliation</u>	<u>Name</u>	<u>Affiliation</u>
W Held	NRC/NRO/DARR	T Bruilir	Department of Energy
A Bradford	NRC/NRO/DARR	P Gaillard	Tennessee Valley Authority
T Boyle	NRC/NRO/DARR	S Barczak	Southern Alliance for Clean Energy
J Shea	NRC/NRO/DARR	E Lyman	Union of Concerned Scientists
M Hart	NRC/NRO/DSEA	T Hicks	Idaho National Laboratory
M McCoppin	NRC/NRO/DSEA	J Kinsey	Idaho National Laboratory
G Cranston	NRC/NRO/DARR	D Alberstein	Idaho National Laboratory
T Kevern	NRC/NRO/DARR	M Callahan	Governmental Strategies Inc.
TJ Kim	NEI	G Fisher	Westinghouse Electric Company
S Mirsky	NuScale Power	S Kauffman	MPR Associates, Inc
E Burns	Westinghouse	P LeJeune	Balch & Bingham LLP
S Kline	Bechtel Power	MV Ramana	Princeton University
S Hobbs	Enercon	D Robillard	PSEG Power, LLC
P Stefanovich	Holtec	E Grant	Excel Services
R Martin	B&W mPower	R Wink	Ameren Missouri
E Williams	B&W mPower	F Shahrokhi	Areva, Inc.
K Jabbour	None provided	D Miller	Canadian Nuclear Safety Commission

Enclosure

NEI New Reactors Mailing List

(Revised 04/22/2013)

cc:

Mr. Gary Wright, Director
Division of Nuclear Facility Safety
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

NEI New Reactors Mailing List

Email

4pareez@gmail.com
Alan.Levin@areva.com (Alan Levin)
alsterdis@tva.gov (Andrea Sterdis)
APAGLIA@Scana.com (Al Paglia)
APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
awyche@bechtel.com (Altheia Wyche)
bellesrj@ornl.gov (Randall Belles)
bendoj@asme.org (John Bendo)
bevans@enercon.com (Bob Evans)
bevardbb@ornl.gov (Bruce Bevard)
Bojan.Petrovic@gatech.edu (Bojan Petrovic)
brian.turner@oca.iowa.gov (Brian Turner)
BSims@Becht.com (Robert Sims)
bwwaites@southernco.com (Brandon Waites)
carey.fleming@cenglic.com (Carey Fleming)
ccmsc@verizon.net (Mike Callahan)
cee@nei.org
charles.bagnal@ge.com (Charles Bagnal)
collinlj@westinghouse.com (Leslie Collins)
cposlusny@babcock.com (Chester Poslusny)
CumminWE@Westinghouse.com (Edward W. Cummins)
curtisslaw@gmail.com (Jim Curtiss)
cwaltman@roe.com (C. Waltman)
david.distel@exeloncorpo.com (David J. Distel)
david.hinds@ge.com (David Hinds)
david.lewis@pillsburylaw.com (David Lewis)
david.newland@cnsccsn.gc.ca (David Newland)
dchapin@mpr.com (Douglas Chapin)
DeLaBarreR@state.gov (R. DeLaBarre)
dianed@nirs.org (Dianed)
dominiquef@nirs.org (Dominique French)
don.tormey@iub.iowa.gov
donald.woodlan@luminant.com (Donald Woodlan)
DPStout@tva.gov (Dan Stout)
draleigh@curtisswright.com (Denna Raleigh)
duane.fournier@iub.iowa.gov
ecullington@earthlink.net (E. Cullington)
ed.burns@earthlink.net (Ed Burns)
eddie.grant@excelservices.com (Eddie Grant)
elyman@ucsusa.org (Ed Lyman)
erg-xl@cox.net (Eddie R. Grant)
eroeste1@bechtel.com (Eric Oesterle)
esmith@moenviron.org (Edward Smith)

NEI New Reactors Mailing List

ewallace@nuscalepower.com (Ed Wallace)
F.Shahrokhi@areva.com (Farshid Shahrokhi)
fletcher@exchangemonitor.com
garent@tva.gov (Gordon Arent)
gcesare@enercon.com (Guy Cesare)
ggeaney@mpr.com (George Geaney)
GovePA@BV.com (Patrick Gove)
gyoung4@entergy.com (Garry Young)
gzinke@entergy.com (George Alan Zinke)
hankwon.choi@wgint.com (Hankwon Choi)
hickste@earthlink.net (Thomas Hicks)
hwilchins@epsilonsystems.com (Howard Wilchins)
jack.kasper@parsons.com (Jack Kasper)
jahalfinger@babcock.com (Jeff Halfinger)
james1.beard@ge.com (James Beard)
james2.ross@ge.com (James Ross)
jason.parker@pillsburylaw.com (Jason Parker)
jennifer.easler@oca.iowa.gov (Jennifer Easler)
jerald.head@ge.com (Jerald Head)
jgutierrez@morganlewis.com (Jay M. Gutierrez)
Jim.Kinsey@inl.gov (James Kinsey)
jim.sundermeyer@iub.iowa.gov
jmr@nei.org (Jeannie Rinckel)
JNR@NuScalePower.com (Jose N. Reyes)
john.elnitsky@pgnmail.com (John Elnitsky)
john.holt@nreca.coop (John Holt)
john.oneill@pillsburylaw.com (John O'Neill)
Joseph_Hegner@dom.com (Joseph Hegner)
jrappe@nuscalepower.com (Jodi Rappe)
jwh1@nreca.coop (John Holt)
kahtan1234@yahoo.com
KAK@nei.org (Kimberly Keithline)
kerri.johannsen@iub.iowa.gov
klingscl@westinghouse.com (Charles Kling)
kouhestani@msn.com (Amir Kouhestani)
kra@nei.org (Katie Austgen)
KSutton@morganlewis.com (Kathryn M. Sutton)
kwaugh@impact-net.org (Kenneth O. Waugh)
Kwelter@NuScalePower.com (Kent Welter)
larry.stevens@iub.iowa.gov
lchandler@morganlewis.com (Lawrence J. Chandler)
libby.jacobs@iub.iowa.gov
mack.thompson@iub.iowa.gov
marcel.deVos@cnscccsn.gc.ca (Marcel DeVos)
maria.webb@pillsburylaw.com (Maria Webb)

NEI New Reactors Mailing List

marilyn.kray@exeloncorp.com
mark.beaumont@wsms.com (Mark Beaumont)
mark.holbrook@inl.gov (Mark Holbrook)
martha.shields@nuclear.energy.gov (Martha Shields)
matias.travieso-diaz@pillsburylaw.com (Matias Travieso-Diaz)
media@nei.org (Scott Peterson)
mgiles@entergy.com (M. Giles)
mirskys@saic.com (Steven Mirsky)
MSF@nei.org (Marvin Fertel)
murawski@newsobserver.com (John Murawski)
nirsnet@nirs.org (Michael Mariotte)
Nuclaw@mindspring.com (Robert Temple)
P.Stefanovic@Holtec.com (Peter Stefanovic)
parveen.baig@iub.iowa.gov
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gallagher@parsons.com (Paul Gallagher)
Paul@beyondnuclear.org (Paul Gunter)
pbessette@morganlewis.com (Paul Bessette)
pcarlone@mpr.com (Pete Carlone)
peter.hastings@duke-energy.com (Peter Hastings)
phg@nei.org (Paul Genoa)
PLorenzini@NuScalePower.com (Paul Lorenzini)
poorewpiil@ornl.gov (Willis P. Poore III)
ramana@Princeton.EDU (M. V. Ramana)
rbarrett@astminc.com (Richard Barrett)
richard.sweigart@duke-eneergy.com (Richard Sweigart)
RJB@NEI.org (Russell Bell)
robert.haemer@pillsburylaw.com (Robert Haemer)
robert.kitchen@pgnmail.com (Robert H. Kitchen)
ronald.polle@oca.iowa.gov
rritzman@firstenergycorp.com (R. Ritzman)
RSnuggerud@NuScalePower.com (Ross Snuggerud)
rxm@nei.org (Rod McCullum)
sabinski@suddenlink.net (Steve A. Bennett)
sfrantz@morganlewis.com (Stephen P. Frantz)
shobbs@enercon.com (Sam Hobbs)
siciliatom@hotmail.com (Mark Campagne)
stan.wolf@iub.iowa.gov
stephan.moen@ge.com (Stephan Moen)
stephen.markus@pillsburylaw.com (Stephen Markus)
steven.hamrick@fpl.com (Steven Hamrick)
strambgb@westinghouse.com (George Stramback)
swkline@bechtel.com (Steve Kline)
tedquinn@cox.net (Ted Quinn)
tgado@roe.com (Burns & Roe)

NEI New Reactors Mailing List

Timothy.Beville@nuclear.energy.gov (Tim Beville)
tjhester@midamerican.com (Tom J. Hester)
tjk@nei.org (T.J. Kim)
tom.miller@nuclear.energy.gov (Thomas P. Miller)
troche@absconsulting.com (Thomas Roche)
trsmith@winston.com (Tyson Smith)
Vanessa.quinn@dhs.gov (Vanessa Quinn)
vince.gilbert@excelservices.com (Vince Gilbert)
vka@nei.org (Victoria Anderson)
Wanda.K.Marshall@dom.com (Wanda K. Marshall)
wayne.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)
william.mcint.com (William Mctigue)
wwbx@hyperionpowergeneration.com (Willis Bixby)
x2gabeck@southernco.com (Gary Becker)